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EXAMINER

BOUTSIKARIS, LEONIDAS

ART UNIT PAPER NUMBER

2872

DATE MAILED: 09/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/782,341

Applicant(s)

MASTERSON, HUGH J.

Examiner

Leo Boutsikaris

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8, 15, 21-22, 24, 26-29, 33, 35-39, 43-47 are rejected under 35 U.S.C. 102(b) as anticipated by Marshall (US 6,406,148).

Regarding claims 1, 21-22, 24, 26-29, 35-39, 43-47, Marshall discloses an electronic color switching system for selectively filtering incident light comprising:

a first interference-filter array comprising dichroic filters 204, 210, 216 arranged to separate the incident beam into a plurality of spectrally complementary beams 206, 212, 218;

an array of configurable optical shutters 320 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array 222 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light 224 (Fig. 3, lines 7-49, col. 6).

Regarding claim 8, the second interference-filter array comprises a first band-edge interference filter 222 from which the output beam 224 emanates and a mirror (adjacent to said filter 222 and not assigned a number in Fig. 3).

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Regarding claims 15, 33, the shutters can be liquid-crystal shutters (lines 57-59, col. 4).

Claims 1-2, 8, 18, 21-24, 26-29, 34, 40, 43-48 are rejected under 35 U.S.C. 102(b) as anticipated by Ledebuhr (US 4,786,146).

Regarding claim 1, 21-24, 26-29, 43-47, Ledebuhr discloses an electronic color illumination system for selectively filtering incident light comprising:

a first interference-filter array comprising dichroic filters 14, 16, 18, arranged to separate the incident beam into a plurality of spectrally complementary beams;

an array of configurable optical shutters 20, 22, 24 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array 40, 42, 44, arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light (Fig. 1, line 39, col. 2 to line 59, col. 3).

Regarding claim 2, the first interference-filter array comprises a first band-edge filter 14 disposed to encounter the incident beam and a mirror 18 disposed to encounter one of the plurality of spectrally complementary beam, since Ledebuhr teaches that the filter 18 may be replaced by a mirror (lines 65-67, col. 3).

Regarding claim 8, the second interference-filter array comprises a first band-edge interference filter 44 from which the output beam emanates and a mirror 40, since Ledebuhr teaches that the filter 40 may be replaced by a mirror (lines 38-40, col. 3).

Regarding claims 18, 34, 40, 48, an input polarizer 12 is disposed to receive the incident beam prior to encountering the first filter array, and an output polarizer 46 is disposed to

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encounter the output beam, wherein the two polarizers have a relative orientation of 90 degrees (Fig. 1, lines 53-55, col. 2).

Claims 21-22, 24, 26, 33-40, 42-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Konno (US 5,327,229).

Konno discloses a color display device comprising a first array of color filters 2-4, a second array of color filters 8-10, wherein an array of optical shutters 5-7 is disposed between respective pairs of optical filters (Fig. 1). The first array of filters separates the incident polarized light into spectrally complementary beams and the second array of filters recombines the separated beams into an output beam (lines 15-51, col. 1).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 7-8, 14, 16-17, 21-22, 24, 26-29, 32, 35-39, 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over LaDuke (US 5,262,895).

Regarding claims 1, 16-17, 21-22, 24, 26-29, 35-39, 43-47, LaDuke discloses an electronic color synthesizer system for selectively filtering incident light comprising:

a first interference-filter array comprising filters 26a, 28 arranged to separate the incident beam into a plurality of spectrally complementary beams 16a, 16i, 16c;

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an array of configurable optical shutters 32, 38, 44 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array comprising filters 26b, 30 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light 16k (line 66, col. 4 to line 53, col. 5).

However, LaDuke teaches that only filter 30 is an interference-type filter, e.g., a dichroic. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make all the filters in LaDuke's system dichroic filters, since Official Notice is taken that dichroic, multi-layer filters which selectively pass certain wavelength ranges of light, and whose operation is based on interference effects, are widely used in the field of projection optics. Interference filters can be designed with great flexibility to provide a desired transmission spectrum and can easily be manufactured via well established thin film coating techniques.

Regarding claim 2, the first interference-filter array comprises a first band-edge filter 26 disposed to encounter the incident beam 16 and a mirror 24 disposed to encounter one of the plurality of spectrally complementary beam, i.e., 16c.

Regarding claim 7, LaDuke discloses all the limitations of said claim, including a band-edge filter 26 and a second mirror 24 disposed to encounter one of the plurality of spectrally complementary beams. However, LaDuke does not show a first mirror that reflects the incident beam and sends it to edge filter 26. It would have been obvious to one of ordinary skill in the art at the time the invention was made to direct the input light to the filter via a first mirror, since Official Notice is taken that the use of mirrors for beam folding an input beam in an optical system is widely known, for achieving, *inter alia*, a more compact system.

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Regarding claim 8, the second interference-filter array comprises a first band-edge interference filter 30 from which the output beam 16k emanates and a mirror 18.

Regarding claims 14, 32, the shutters can be mechanical shutters such as iris diaphragms or sliding blade apertures (lines 61-63, col. 3).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over LaDuke (US 5,262,895) in view of Marshall (US 6,406,148).

LaDuke discloses all the limitations of said claim, including a second mirror 18 disposed to encounter one of the plurality of spectrally complementary beams, i.e., 16a, and a band-edge filter 30 disposed to transmit the output beam 16k. However, LaDuke does not show a first mirror from which the output beam emanates and which receives the output light from said filter. As described *supra*, in Marshall's system, an output mirror is used to receive the output light from the last filter 222 and (re)direct it towards the SLM 226. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an output mirror in LaDuke's system for beam-folding purposes.

Claims 3-6, 9-12, 20, 25, 30-31, 41, 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ledebuhr (US 4,786,146).

Regarding claim 3, Ledebuhr discloses all the limitations of said claim except for teaching that a plurality, i.e., more than one filter is disposed between the first filter 14 receiving the incident light and the mirror 18. Fig. 1 shows one filter, 16, disposed between filter 14 and mirror 18. It would have been obvious to one of ordinary skill in the art at the time the invention

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was made to include several filters between the first filter and the mirror in the system of Fig. 1, since it has been held that discovering an optimum value of a result effective variable includes only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Here, the result effective variable is the number and extent of the non-overlapping, complementary spectral regions that the incident spectrum is split by the array of the filters. The greater the number of the complementary spectral regions is, a greater flexibility in controlling the hue of the (recombined) output light exists, by appropriately operating the optical shutters disposed between the first and the second array of optical filters.

Regarding claim 4, all the filters and the mirrors are inclined 45 degrees relative to the optical path.

Regarding claims 5-6, the filters are such that one allows only the high wavelengths, e.g., blue, to pass through, whereas the rest allow the lower wavelengths to pass through.

Regarding claim 9, Ledebuhr discloses all the limitations of said claim except for teaching that a plurality, i.e., more than one filter is disposed between the last filter 44 emitting the output light and the mirror 40. Fig. 1 shows one filter, 42, disposed between filter 44 and mirror 40. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include several filters between the last filter and the mirror in the system of Fig. 1, since it has been held that discovering an optimum value of a result effective variable includes only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Here, the result effective variable is the number and extent of the non-overlapping, complementary spectral regions that the incident spectrum is split by the array of the filters. The greater the number of the complementary spectral regions is, a greater flexibility in controlling the hue of



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the (recombined) output light exists, by appropriately operating the optical shutters disposed between the first and the second array of optical filters.

Regarding claim 10, all the filters and the mirrors are inclined 45 degrees relative to the optical path.

Regarding claims 11-12, the filters are such that one allows only the high wavelengths, e.g., blue, to pass through, whereas the rest allow the lower wavelengths to pass through.

Regarding claims 30-31, Ledebuhr discloses all the limitations of said claims except for specifying the type of the interference filter used in the optical system, i.e., Raman edge filter or Rugate notch filter. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use said types of filters, since Official Notice is taken that these filters are widely used in the field of optics.

Claims 20, 25, 41, 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ledebuhr (US 4,786,146) in view of Mitsutake (EP 0520369).

Ledebuhr discloses all the limitations of said claims except for showing a pair of polarizers disposed before and after each optical shutter, the pair of polarizers being at 90 degrees relative to each other. Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the switches in Ledebuhr's system between respective polarizers

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and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the switches.

Claims 1, 19, 21-24, 26-29, 35-39, 42-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho (US 6,398,363).

Regarding claims 1, 21-24, 26-29, 35-39, 43-47, Ho discloses an electronic color projection system for selectively filtering incident light comprising:

a first interference-filter array comprising filters 60, 62, 64 arranged to separate the incident beam into a plurality of spectrally complementary beams Sr, Sg, Sb;

an array of configurable optical shutters 52, 54, 56 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array comprising filters 61, 63, 65 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light Srgb (Fig. 4).

However, LaDuke does not specify that the filters are interference-type filters. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make all the filters in LaDuke's system interference filters, since Official Notice is taken that interference, multi-layer filters which selectively pass certain wavelength ranges of light, and whose operation is based on interference effects, are widely used in the field of projection optics. Interference filters can be designed with great flexibility to provide a desired transmission spectrum and can easily be manufactured via well established thin film coating techniques.

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Regarding claims 19, 42, in Ho's system, the various filters separate the incident beams into output beams having complementary polarization states, i.e., s and p.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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